WORK PLAN

FIELD SAMPLING PLAN RCRA ENVIRONMENTAL INDICATOR FOR CURRENT HUMAN EXPOSURE (CA-725)

W.G.KRUMMRICH PLANT
SAUGET, IL

Prepared for
W.G. Krummrich Plant
520 Monsanto Avenue
Sauget, Illinois 62206

SOLUTIA

November 2002

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November 25, 2002

Mr. Ken Bardo
RCRA Division
U. S. Environmental Protection Agency, Region 5
77 West Jackson Blvd.
Chicago, IL 60604

Re: Soil Sampling and Analysis Plans
Solutia W. G. Krummrich Plant
Sauget, Illinois

Dear Mr. Bardo:

Attached are copies of Project Plans describing the soil sampling and analyses that Solutia proposes to undertake at its W. G. Krummrich Plant in the near future. Based on a draft Conceptual Site Model (CSM) developed by Solutia, the two media that appear to require investigation to determine if either poses current health risks are soils and indoor air. The attached Project Plans, which include a Field Sampling Plan, a Quality Assurance Project Plan, and a Health and Safety Plan, describe the scope of the proposed soil investigation.

A separate, but similar, set of plans are being prepared that describe the proposed air investigation program. Those plans will be submitted to you by December 12, 2002. That will allow you an opportunity to review the scope of the proposed air sampling prior to your planned site visit on December 16 and 17, 2002.

We look forward to receiving your comments on the attached plans. If you have any questions, please call me at (618) 482-6340.

Sincerely,
Solutia Inc.

Richard Williams

Richard S. Williams
Sauget Sites Project manager

cc: Michael Ribordy, USEPA
Jim Moore, IEPA
Gina Search, IEPA
John Belin, Booz Allen & Hamilton
Linda Tape, Husch Eppenberger
Bruce Yare, Solutia

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SECTIONONE Project Background

1.1 INTRODUCTION

Solutia Inc. (Solutia) is undertaking a surface and subsurface soil sampling program at its W.G. Krummrich Plant in Sauget, Illinois to facilitate the completion of the Resource Conservation and Recovery Act (RCRA) Current Human Exposure Environmental Indicators (EI) Report (CA-725).

A Site Sampling Plan (SSP) was previously developed and included in the "Description of Current Conditions Report" (DOCC) dated August 1, 2000 (Solutia, 2000). The DOCC report was prepared in accordance with Section VI of the Administrative Order on Consent (EPA Docket R8H-5-00-003, dated May 26, 2000) (Order). The SSP addresses the collection of surface water, groundwater, and soil samples. This Field Sampling Plan (FSP) has been prepared to facilitate the soil sampling objective of the SSP. To accomplish this objective, and in accordance with the Order, a Field Sampling Plan, Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HASP) have been prepared. The main components of the SSP addressed in this FSP include:

- Surface soil sampling
- Subsurface soil sampling

Background information with respect to the Krummrich Plant is provided in the DOCC Report.

SECTIONTWO Project Scope and Objectives

The purpose of the FSP is to describe soil surface and subsurface sampling to be carried out at the Krummrich Plant to gather enough data for the completion of the EI Report for current human exposures. The facility location is shown in **Figure 1**. Collected data will be used to prepare a Human Health Risk Assessment (HHRA) to help support the EI report conclusions.

In November 2002, Solutia transmitted to USEPA a draft Conceptual Site Model (CSM) for the site. The CSM was developed to support the EI evaluation for human exposures and identifies the potentially complete exposure pathways and the sources and mechanisms by which human receptors may be exposed. Thus, it helps define data needs for completion of the EI evaluation. A copy of this draft CSM is included in **Appendix A**. At the time of submission of this FSP, comments on the draft model had just been received from USEPA. Those comments have been reviewed and, at least on a preliminary basis, do not appear to affect the scope of work described in this document. Responses to those comments are being prepared and a revised CSM will be submitted to USEPA.

The draft CSM concluded that additional data are needed to evaluate the soil and air pathways. This FSP describes the scope of work to gather the necessary soil data. A separate FSP will be submitted describing the investigations necessary to evaluate potential current human health risks posed by the air pathway.

It is estimated that the field investigation, laboratory analysis, data interpretation and the report preparation will take approximately 4 to 5 months from the work plan approval.

SECTIONTHREE — Field Activities

3.1 SOIL SAMPLES

This program has been designed as a grid-based effort and is not intended to address each Solid Waste Management Unit (SWMU) or Area of Concern (AOC) on an individual basis. The basic sampling scheme consists of a 300 ft by 300 ft grid overlain on the areas of the plant where surface and subsurface environmental impacts are known or suspected to have occurred (**Figure 2**). This includes the areas currently and historically used for manufacturing (DOCC report). One soil boring is proposed for each grid square for a total of 61 boring locations. The actual locations will be determined in the field and will be biased based on site features and previously identified areas such as SWMUs or AOCs, or questionable areas identified from aerial photographs. Thus, in addition to the grid locations shown on **Figure 2**, an allowance of 5 additional sampling locations have been included in the investigation plan to cover these questionable areas.

Rationale

The sampling rationale is based on the CSM. The primary receptors are site workers who might come in contact with affected soils. The maximum depth of utilities at the plant that could require maintenance is 15 ft. However, routine maintenance activities will not occur below the groundwater table and, consequently, it is not necessary to sample below the water table. Thus, soil borings will extend to the groundwater table, or to a depth of approximately 15 ft at the locations shown in **Figure 2,** whichever occurs first.

The analytical suite includes combinations of VOCs, SVOCs, pesticides, herbicides, PCBs, dioxins and metals. Many samples will be analyzed for all the analyte groups. However, the following procedure is proposed to focus the extent of testing.

- All collected samples will be analyzed for VOCs and SVOCs. In addition, samples collected from the facility (not including the River Terminal and the pipeline route) will also be analyzed for PCBs. These analyte groups include those analytes most prevalent in manufacturing processes at the facility as well as those most frequently detected in previous investigations at the facility (see DOCC report).

- All the shallow samples will be analyzed for metals with the exception of samples collected from the River Terminal or the pipeline route[1]. The deeper samples will be collected and retained at the laboratory until shallow preliminary results are available. The preliminary metals results will be compared with Data Quality Levels (DQLs) identified in the QAPP. If the DQL values are exceeded in the shallow samples, then the deeper samples will be tested.
- Samples for dioxin analysis will be focused in areas where relatively high levels of PCBs are present and/or areas associated with production of chlorophenols. Sampling and analysis associated with RCRA closures indicated a direct relationship between these constituents (Solutia, 1998). Samples will be collected for dioxin analysis, submitted to the laboratory, and extracted. If the preliminary PCB results in any sample exceed the DQL level (1 mg/kg) or any preliminary chlorophenol result (tested as SVOCs) exceed the DQL levels (2,4,5-trichlorophenol 200,000 mg/kg, 2,4,6-trichlorophenol 390 mg/kg and 2,4-dichlorophenol 610 mg/kg), then that sample extract will be analyzed for dioxins.
- The primary pesticide produced at the facility is paradichlorobenzene (e.g., ingredient in moth balls). This analyte is reported as an SVOC. Chlorinated pesticides and herbicides were not produced at the plant as currently configured. Herbicides were historically produced by Monsanto in areas now occupied by Ethyl Corp. (e.g., north of the facility). However, Solutia proposes to analyze samples for pesticides and herbicides on a 600-ft grid spacing (i.e., every other location shown on **Figure 2**).

Table 1 presents the analytical methods to be used during the investigation. A detailed sample summary for the soil sampling is presented in **Table 2**.

Field Procedures

The borings will be advanced using direct-push techniques (e.g., Geoprobe®). They will be continuously sampled, logged based on recovered samples, and screened with a photoioinization detector (PID). Two samples will be collected from each boring. One sample will be obtained from the 0 to 2 ft bgs interval and will be indicative of surface and near-surface exposures. The second sample will be collected from an interval between the surface and total depth that is judged to be most impacted based on field observations. Borings will not be terminated in material that is judged to be highly impacted (i.e., waste material). If these types of materials are

[1] Constituents of potential concern for the River Terminal and pipeline route include VOCs and SVOCs.

present at a depth of 15 ft, drilling and sampling will continue until this material has been vertically defined (based on field observations). However, borings will not extend into the water table. Upon completion, the borings will be backfilled with granular bentonite.

Prior to initiating sampling activities, the boring locations will be marked and the locations will be reviewed with Solutia to check for buried utilities.

Appendices B and C present the standard operating procedures for soil sample collection and guidance on sample logging, respectively.

The field activities include documentation, QA/QC activities, equipment decontamination, and handling of investigation derived waste. A brief discussion of these topics is presented below.

DOCUMENTATION

URS personnel will keep a bound field notebook while performing sampling and oversight activities on-site. The field notebook will contain general information including but not limited to:

- Date, time, weather conditions, equipment, and personnel on site
- Area in which the work was performed
- Specific work activities conducted
- Photoionization detector (PID), combustible gas meter (explosimeter), and real time aerosol monitor (RAM) readings.

In addition to the general information discussed above, the field notebook will also contain specific information regarding the daily work activities. This information will include but is not limited to:

- Samples collected
- Depth of borings
- Observations of site conditions
- All changes to the Scope of Work or Health and Safety procedures.

The minimum documentation requirements for the field notebooks are provided in Section 6 of this FSP.

QA/QC

To verify field and laboratory procedures, quality assurance/quality control (QA/QC) samples consisting of duplicate samples, matrix spike/matrix spike duplicate (MS/MSD) samples, field blanks and trip blanks will be collected and submitted to the laboratory. The sampling procedures and frequency will follow QA/QC Standard Operating Procedures (SOPs) located in **Appendix D** of this FSP.

Analytical samples (including QA/QC samples) will be tracked using appropriate Chain-of-Custody documentation. The Chain-of-Custody procedures are described in Section 6.1.3 of this FSP.

Decontamination

In order to reduce the potential for exposure to hazardous materials and limit the possibility of cross contamination of samples, personnel and equipment will be subject to a decontamination program. All equipment used on-site that comes into contact with site soils will be decontaminated prior to beginning work, between sampling locations and/or uses, and prior to demobilizing from the site. Section 9 of this report describes proper decontamination procedures.

Investigation Derived Waste

Investigation Derived Waste (IDW) will be placed in containers such as over-pack drums or roll-off containers. The various containers will be stored within a central Solutia-designated storage area pending appropriate disposal.

SECTIONFOUR Project Organization and Responsibilities

URS Corporation (URS) will perform the field activities, validate and interpret the data, prepare the EI report, and provide project management for support sampling activities. Analytical services for the investigation described in this FSP will be provided by Severn-Trent Laboratories located in Savannah, Georgia and Sacramento, California. ENSR International will perform the Human Health Risk Assessment. The responsibilities of key project personnel are described below. The responsibilities of key laboratory personnel are described the QAPP.

4.1 PROJECT ORGANIZATION

The responsibilities of the key project personnel and the lines of authority for the project personnel are described below.

4.2 MANAGEMENT RESPONSIBILITIES

4.2.1 USEPA Region V Remedial Project Manager

The USEPA Region V Remedial Project Manager (USEPA RPM) for this study will be Ken Bardo.

4.2.2 Solutia Project Manager

Richard Williams will serve as the Solutia Project Manager. As such, he will have the overall responsibility for the project. He will be responsible for implementing the project and will have the authority to commit the resources necessary to meet project objectives and requirements. His primary function is to verify that technical, financial, and scheduling objectives are achieved successfully. He will provide the major point of contact and control for matters concerning the project. The Solutia Project Manager will:

- Define project objectives and develop a sampling plan schedule
- Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task
- Acquire and apply technical and financial resources as needed to verify performance within budget and schedule constraints
- Monitor and direct the field leaders
- Develop and meet ongoing project staffing requirements

- Review the work performed on each task to verify its quality, responsiveness, and timeliness
- Review and analyze overall task performance with respect to planned requirements and authorizations
- Approve reports before their submission to USEPA Region V
- Ultimately be responsible for the preparation and quality of reports
- Represent Solutia at meetings.

4.2.3 URS Project Officer

Robert Billman will serve as the URS Project Officer. He will be responsible for the overall administration and technical execution of the project. He will report directly to the Solutia Project Manager.

4.2.4 URS Project Manager

Jeff Adams will serve as the URS Project Manager (PM). He will have overall responsibility for verifying that the project meets the stated objectives and URS quality standards. He will report directly to the URS Project Officer and is responsible for technical quality control and project oversight.

4.3 QUALITY ASSURANCE (QA) RESPONSIBILITIES

4.3.1 URS Data Validator

John Kearns of URS will serve as the lead third party data validator. He will remain independent of direct job involvement and day-to-day operations and have direct access to corporate executive staff as necessary to resolve QA disputes. The data validator will be responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations, URS's policies, and USEPA requirements. The specific functions that he or a designee perform may include:

- Providing QA audits on various phases of the field operations
- Reviewing and approving the QA plans and procedures
- Reporting on the adequacy, status, and effectiveness of the QA program on a regular

- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the URS Project Officer
- Data validation of sample results from the analytical laboratory, as appropriate.

4.3.2 URS QA Officer

Amelia Turnell will serve as the URS QA Officer (QAO). She will report directly to the URS Project Officer and will be responsible for verifying that all URS QA procedures for this project are being followed.

4.3.3 USEPA Region V Quality Assurance Reviewer

Ken Bardo, the USEPA Region V RPM, or a designee, will serve as the USEPA Region V Quality Assurance Reviewer. He will have the responsibility to review and approve the QAPP. In addition, he will be responsible for conducting external performance and system audits of the laboratory and field activities. He will also review and evaluate analytical laboratory and field procedures.

4.4 FIELD RESPONSIBILITIES

4.4.1 URS Field Team Leader

Jeff Adams, Steve Bunsen, or a designee, will serve as the URS Field Team Leader. The Field Team Leader will be responsible for leading, coordinating, and supervising the day-to-day field activities. His primary responsibilities include:

- Provision of day-to-day coordination with the URS Project Officer on technical issues
- Develop and implement field-related sampling plans and schedule
- Coordinate and manage field staff
- Supervise or act as the field sample custodian
- Implement the QC for technical data, including field measurements
- Adhere to work schedules
- Coordinate and oversee technical efforts of subcontractors assisting the field team

- Identify problems at the field team level, resolve difficulties in consultation with the URS Project Officer, implement and document corrective action procedures, and provide communication between team and upper management

4.4.2 URS Field Team

The technical staff will be drawn from URS' pool of resources. The technical staff will be utilized to gather and analyze data, and to prepare various task reports and support materials. The technical staff consists of experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work.

4.4.3 Health and Safety Officer

The Health and Safety Officer will be responsible for implementing the site-specific health and safety directives in the Health and Safety Plan and documenting all health and safety related activities. The Field Team Leader may serve as the Site Health and Safety Officer.

SECTIONFIVE Non-Measurement Data Acquisition

5.1 TOPOGRAPHIC MAP AND SAMPLE LOCATION SURVEYING

Information submitted to USEPA Region V describing sampling locations will be identified in the field using a global positioning satellite (GPS) system or traditional land survey techniques. The GPS system will be capable of producing decimal latitude and longitude readings and it will have a horizontal accuracy of one meter or less.

5.2 AERIAL PHOTOGRAPH ACQUISITION AND ANALYSIS

Available historical air photographs have been reviewed to determine the presence of past waste disposal practices. Many of the photos are contained in the DOCC report. Information obtained from this exercise was used to determine the final locations of the sampling points described in this plan.

SECTIONSIX Field Operations Documentation

The field sampling team will maintain a set of field logbooks. Forms that will be used include: chain-of-custody, test boring logs, and field log data sheets. The appendices contain copies of some of these forms.

The field logbooks will contain tabulated results of field measurements and documentation of field instrument calibration activities. The field logbooks will also record the following:

- Personnel conducting the site activities, their arrival and departure times, and their destination at the site
- Incidents and unusual activities that occur on the site such as, but not limited to, accidents, breaches of security, injuries, equipment failures, or weather related delays
- Changes to the FSP and the HASP
- Daily information such as:
  - Work accomplished and the current site status
  - Equipment calibrations, repairs and results
  - Site work zones.

In the field sampler's individual bound field logbook, samplers will note, with permanent ink, meteorological data, equipment employed for sample collection, calculations, information regarding collection of QA/QC samples, and any other observations. All entries will be signed and dated, and any entry, which is to be deleted will have a single cross out which is signed and dated. The following sampling-related information will be recorded in the field logbook by the field sampling team:

- Project identification
- Sample number
- Sampling location
- Required analysis
- Date and time of sample collection
- Type and matrix of sample
- Sampling technique

- Preservative used, if applicable
- Sampling conditions
- Observations
- Initials of the sampler.

Photographs will be taken showing representative conditions of the work.

6.1 SAMPLE DOCUMENTATION

6.1.1 Sample Identification System

The sample identification system will involve the following:

- Soil samples will be labeled SOIL-WGK-S1-__FT where "SOIL" denotes a soil sample, "WGK" is the site designation, "S1" is the sequentially numbered sampling station, and "__FT" indicates the sample depth range (e.g., 0-2).
- "MS/MSD" or "DUP" at the end of a sample identification will indicate a matrix spike/matrix spike duplicate/spike duplicate or a duplicate sample, respectively.

6.1.2 Sample Labels

For proper identification in the field and proper tracking by the analytical laboratory, samples will be labeled in a clear and consistent fashion. Sample labels will be waterproof, or sample containers will be sealed in plastic bags.

A completed sample label will be attached to each investigative or QC sample. The following will be recorded with permanent ink on sample labels by the field sampling team:

- Project name and number
- Sample number identification
- Initials of sampler
- Required analysis
- Date and time of sample collection
- Analysis and preservative used, if applicable.

6.1.3 Chain-of-Custody Records

Chain-of-custody procedures will be instituted and followed throughout the sampling activities Samples are physical evidence and will be handled according to strict chain-of-custody protocols. The field sampler is personally responsible for the care and custody of the sample until transferred. For proper identification in the field and proper tracking by the analytical laboratory, samples will be labeled in a clear and consistent fashion.

The following information will be recorded with permanent ink on the chain-of-custody by the field sampling team:

- Project identification and number
- Sample description/location
- Required analysis
- Date and time of sample collection
- Type and matrix of sample
- Number of sample containers
- Analysis requested/comments
- Sampler signature/date/time
- Air bill number.

The laboratory will assign a number for each sample upon receipt. That sample number will be placed on the sample label. The label will be attached to the sample container. A chain-of-custody document providing all information, signatures, dates, and other information, as required on the example chain-of-custody form in **Appendix E** will be completed by the field sampler and provided for each sample cooler. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the chain-of-custody. The field sampler will sign the chain-of-custody form when relinquishing custody, make a copy to keep with the field logbook, and include the original form in an air-tight plastic bag in the sample cooler with the associated samples.

6.2 FIELD ANALYTICAL RECORDS

Field analytical records will consist of field logbook entries for field instruments. Only direct reading instrumentation will be employed in the field. The use of a photoionization detector (PID), an explosimeter, and a real time aerosol monitor (RAM) will generate some measurements directly read from the meters following calibration by the respective manufacturer's recommendations. Such data will be written into field logbooks immediately after measurements are taken. Calibration records will also be recorded in the logbooks.

6.3 DATA MANAGEMENT AND RETENTION

The field data and documentation, as described in this section, will become a part of the final evidence file. The final evidence file will be the central repository for all documents, which constitute evidence relevant to sampling and analysis activities as described in this FSP and the QAPP. URS is the custodian of the evidence file and maintains the contents of evidence files for the site, including all relevant records, logs, field logbooks, pictures, subcontractor reports, and data reviews. The database management system may be managed by URS, or by another organization selected by Solutia.

Upon completion of the analyses, the URS QAO will begin assimilating the field and laboratory notes. In this way, the file for the samples will be generated. The final file for the samples will be stored at URS and will consist of the following:

- Laboratory data packages, including summary and raw data from the analysis of environmental and QC samples, chromatograms, mass spectra, calibration data, work sheets, and sample preparation notebooks
- Chain-of-custody records
- Data validation reports.

The following documentation will supplement the chain-of-custody records:

- Field logbooks and data
- Field collection report
- Photographs and drawings
- Progress and QA reports

- Contractor and subcontractor reports
- Correspondence.

The evidence file must be maintained in a secured, limited access area until all submittals for the project have been reviewed and approved, and for a minimum of six years-past the submittal date of the final report.

SECTIONSEVEN Personal Protective Equipment

The basic level of PPE to be used at the W.G. Krummrich Plant during intrusive and non-intrusive activities is a modification of OSHA Level D. PPE may be upgraded based on air monitoring results or at the discretion of the Project Manager and based on the Site Safety Officer's (SSO) recommendations.

Personal protective equipment (PPE) requirements for each level of protection for URS personnel are described in the HASP prepared for these field activities.

SECTIONEIGHT Sample Packaging and Shipping

A completed sample label will be attached to each investigative or QC sample and the sample placed in a shipping container. Information to be recorded on sample labels is described in Section 6.1.2. Information to be recorded on chain-of-custody forms is described in Section 6.1.3. The sample identification system used in the field is described in Section 6.1.1.

Sampling containers will be packed in such a way as to help prevent breakage and cross-contamination. Samples will be shipped in coolers, each containing a chain-of-custody form and ice and ice packs to maintain inside temperature at approximately 4°C. Sample coolers will then be sealed between the lid and sides of the cooler with a custody seal prior to shipment. The custody seal will be an adhesive-backed tape that easily rips if it is disturbed. Samples will be shipped as follows:

STL Savannah Laboratories 5102 LaRoche Ave. Savannah, GA 31404	STL Laboratories Sacramento 880 Riverside Parkway West Sacramento, CA 95605

Samples will not be sent to another laboratory without the permission of USEPA Region V. Sample transportation will comply with U.S. Department of Transportation regulations. Special sampling packing provisions will be made for samples requiring additional protection.

Samples will remain in the custody of the sampler until transfer of custody is completed. Transfer consists of:

- Delivery of samples to the laboratory sample custodian
- Signature of the laboratory sample custodian on the chain-of-custody document as receiving the samples, and signature of sampler as relinquishing the samples.

If a carrier is used to take samples between the sampler and the laboratory, a copy of the air bill must be attached to the chain-of-custody to maintain proof of custody.

SECTIONNINE Decontamination

Sampling activities will occur in widely separated locations. Therefore, personnel and equipment decontamination will be accomplished at each sampling area using temporary facilities. Section 9 of the HASP describes personnel and monitoring equipment decontamination procedures and supplies. PPE, disposable sampling equipment, cuttings, and field decontamination wastes will be collected at the point of generation and stored in temporary containers. PPE, solids, and liquids will be consolidated in separate bulk containers at a central area. The sampling procedures have been developed to minimize the quantity of waste generated.

The performance audit is an independent check to evaluate the quality of data being generated. The system audit is an on-site review and evaluation of the quality control practices, sampling procedures, and documentation procedures.

At the discretion of the URS PO, performance and system audits of field activities will be conducted to verify that sampling and analyses are performed in accordance with the procedures established in this FSP and the QAPP. The audits of field activities include two independent parts: internal and external audits.

The internal audits will be performed by the URS QAO. The external audits will be performed by USEPA Region V.

10.1 FIELD PERFORMANCE AND SYSTEM AUDITS

10.1.1 Internal Field Audits

Internal field audit responsibilities. Internal audits of field activities, including sampling and field measurements will be conducted by the URS QAO or her designee.

Internal field audit frequency. These audits will verify that all established procedures are being followed. Internal field audits will be conducted at least once at the beginning of the site sample collection activities and anytime thereafter as determined by the URS PO.

Internal field audit procedures. The audits will include examination of field sampling records, field instrumentation operating records, sample collection, handling and packaging in compliance with the established procedures, maintenance of QA procedures, chain-of-custody, and other elements of the field program. Follow up audits will be conducted to correct deficiencies and to verify that QA procedures are maintained throughout the project. The audits will involve review of field measurement records, instrumentation calibration records, and sample documentation. The areas of concern in a field audit include:

- Sampling procedures
- Decontamination of sampling equipment, if applicable
- Chain-of-custody procedures
- Standard operating procedures

- Proper documentation in field notebooks
- Subcontractor procedures.

10.1.2 External Field Audits

External field audit responsibilities. External field audits may be conducted by USEPA Region V.

External field audit frequency. External field audits may be conducted at any time during the field operations. These audits may or may not be announced and are at the discretion of USEPA Region V.

Overview of the external field audit process. External field audits will be conducted according to the field activity information presented in this FSP and the QAPP.

SECTIONELEVEN Corrective Action

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out-of-control performance, which can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation, and data assessment. Corrective action proposed and implemented will be documented in the regular quality assurance reports to management. Corrective action should only be implemented after approval by the URS PO or the URS PM. If immediate corrective action is required, approvals secured by telephone from the Project Officer should be documented in an additional memorandum.

For noncompliance problems, a formal corrective action program will be developed and implemented at the time the problem is identified. The person who identifies the problem will be responsible for notifying the URS PM, who in turn will notify the URS PO. Implementation of corrective action will be confirmed in writing through the same channels. Nonconformance with the established quality control procedures in the QAPP or FSP will be identified and corrected in accordance with the QAPP.

11.1 FIELD CORRECTIVE ACTION

Corrective action in the field can be needed when the sample network is changed (i.e., more or less samples, sampling location changes, and related modifications) or sampling procedures and/or field analytical procedures require modification due to unexpected conditions. Technical staff and project personnel will be responsible for reporting all suspected technical or QA nonconformances or suspected deficiencies of any activity or issued document by reporting the situation to the URS PM. The URS PM will be responsible for assessing the suspected problems in consultation with the URS PO and assessing the potential for the situation to impact the quality of the data. If the situation warrants reportable nonconformance requiring corrective action, a nonconformance report will be initiated by the URS PM.

The URS PM will be responsible for seeing that corrective actions for nonconformance are initiated by:

- Evaluating reported nonconformances
- Controlling additional work on nonconforming items
- Establishing disposition or action to be taken

- Maintaining a log of nonconformances
- Reviewing nonconformance reports and corrective actions taken
- Verifying nonconformance reports are included in the final site documentation in project files.

If appropriate, the URS Field Team Leader will verify that no additional work dependent on the nonconforming activity is performed until the corrective actions are completed. Corrective action for field measurements may include:

- Repeat the measurement to check the error
- Check for proper adjustments for ambient conditions, such as temperature
- Check the batteries
- Recalibration
- Check the calibration
- Replace the instrument or measurement devices
- Stop work (if necessary).

The URS Field Team Leader is responsible for site activities. In this role, the URS Field Team Leader, at times, is required to adjust the site programs to accommodate site-specific needs. When it becomes necessary to modify a program, the responsible person notifies the URS Field Team Leader of the anticipated change and implements the necessary changes after obtaining the approval of the URS Field Team Leader. The change in the program will be documented on the field change request (FCR) that will be signed by the initiators and the URS Field Team Leader. The FCR for each document will be numbered serially as required. The FCR will be attached to the file copy of the affected document. The URS Field Team Leader must approve the change in writing or verbally prior to field implementation, if feasible. If unacceptable, the action taken during the period of deviation will be evaluated to determine the significance of any departure from established program practices.

The URS Field Team Leader is responsible for controlling, tracking, and implementing identified changes. Reports on changes will be distributed to affected parties, which includes USEPA Region V.

SECTIONELEVEN Corrective Action

Corrective action resulting from internal field audits will be implemented immediately if data may be adversely affected due to unapproved or improper use of approved methods. The URS QAO will identify deficiencies and recommend corrective action to the URS PM. Implementation of corrective actions will be performed by the URS Field Team Leader and the field team. Corrective action will be documented in the quality assurance report to the project management.

Corrective actions will be implemented and documented in the field notebook. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped by USEPA Region V.

The URS QAO and Laboratory QAO may identify the need for corrective action during either the data validation or data assessment. Potential types of corrective action may include resampling by the field team or re-injection or reanalysis of samples by the laboratory. These actions are dependent upon the ability to mobilize the field team or, whether the data to be collected is necessary to meet the required quality assurance objectives. When the URS QAO or Laboratory QAO identifies a corrective action situation, it is the URS PO who will be responsible for approving the implementation of corrective action, including resampling, during data assessment. Corrective-actions of this type will be documented by the URS QAO and the Laboratory QAO.

SECTIONTWELVE References

Solutia, 1998. Status Report Hazardous Waste Management Unit Closure, October 1998. Prepared by Radian International.

Solutia, 2000. Description of Current Conditions Report, August 1, 2000. Prepared by URS Corporation.

Tables

TABLE 1

Analytical Methods for Surface and Subsurface Soil Samples
WGK HEEI Investigation

PARAMETER	METHOD
VOCs	8260B
SVOCs	8270C
Pesticides	8081A
Herbicides	8151A
PCBs	680
Metals	6010B
Dioxins	8280A

TABLE 2

Collection and Analysis Summary

WGK HEEI Soil Investigation Field Sampling Plan

Parameters	Number of Investigative Samples Collected	Number of Field Blanks / Equipment Blanks	Number of Field Duplicates	Number of Matrix Spike / Matrix Spike Duplicates	Number of Trip Blanks	Sample Containers (number, size, type)	Preservation	Holding Time Extraction Analysis
VOCs	61 surface 60 subsurface	One per 10, or fraction of 10, samples collected (12)	One per 10, or fraction of 10, samples (12)	One per 20, or fraction of 20, samples collected (6)	One per sample cooler containing VOC analysis	3-Encore™ samplers (or in accordance with USEPA Method 5035)	4°C	Transferred to soil container or analyzed 48 hours from collection
SVOCs	61 surface 60 subsurface	One per 10, or fraction of 10, samples collected (12)	One per 10, or fraction of 10, samples (12)	One per 20, or fraction of 20, samples collected (6)	NA	250 mL wide mouth glass container with Teflon™-lined lid	4°C	14 days from collection to extraction; 40 days from extraction to analysis;
Pesticides	31 surface 30 subsurface	One per 10, or fraction of 10, samples collected (6)	One per 10, or fraction of 10, samples (6)	One per 20, or fraction of 20, samples collected (4)	NA	250 mL wide mouth glass container with Teflon™-lined lid	4°C	14 days from collection to extraction; 40 days from extraction to analysis
Herbicides	31 surface 30 subsurface	One per 10, or fraction of 10, samples collected (6)	One per 10, or fraction of 10, samples (6)	One per 20, or fraction of 20, samples collected (4)	NA	250 mL wide mouth glass container with Teflon™-lined lid	4°C	14 days from collection to extraction; 40 days from extraction to analysis;
PCBs	47 surface 46 subsurface	One per 10, or fraction of 10, samples collected (10)	One per 10, or fraction of 10, samples (10)	One per 20, or fraction of 20, samples collected (5)	NA	500 mL wide mouth glass container	4oC	14 days from collection to extraction; 40 days from extraction to analysis

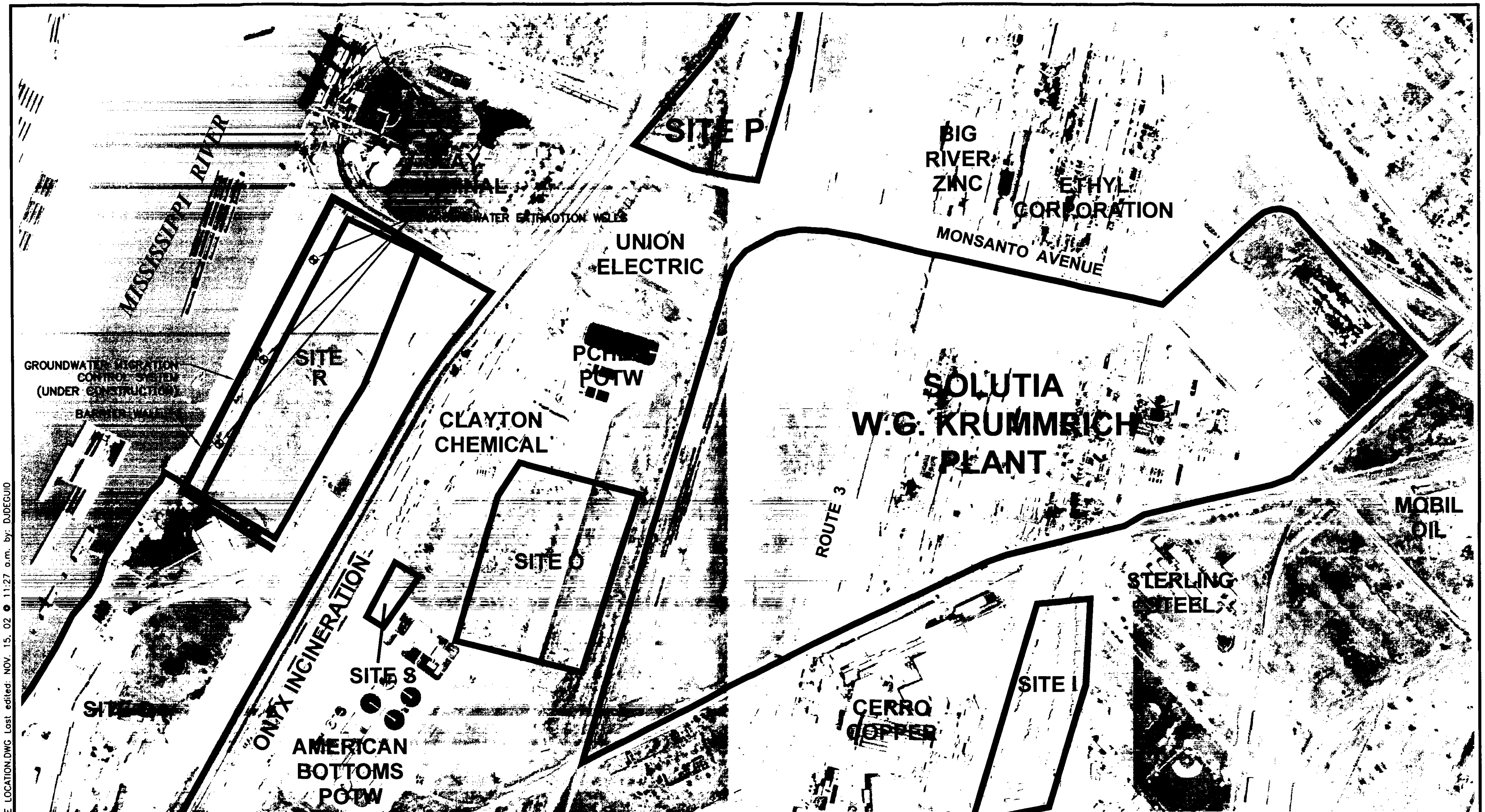
TABLE 2

Sample and Analysis Summary

WGK HEEI Soil Investigation Field Sampling Plan

Parameters	Number of Investigative Samples Collected	Number of Field Blanks / Equipment Blanks	Number of Field Duplicates	Number of Matrix Spike / Matrix Spike Duplicates	Number of Trip Blanks	Sample Containers (number, size, type)	Preservation	Holding Time Extraction Analysis
Dioxins	47 surface 46 subsurface	One per 10, or fraction of 10, samples collected (10)	One per 10, or fraction of 10, samples (10)	One per 20, or fraction of 20, samples collected (5)	NA	100 grams in 4 oz. Amber glass jar with Teflon™-lined lid	4°C	30 days from collection to extraction, 45 days from extraction to analysis; Extract all samples. Analyze only samples where PCBs or chlorophenols have exceeded DQLs
Metals	47 surface 46 subsurface	One per 10, or fraction of 10, samples collected (10)	One per 10, or fraction of 10, samples (10)	One per 20, or fraction of 20, samples collected (5)	NA	4 ounce wide mouth polyethylene or fluorocarbon (TFE or PFA) container	4°C	180 days from collection; Analyze all the shallow samples. When preliminary results are available compare results with DQLs. If DQLs are exceeded in the shallow samples, test the deeper samples.

Figures

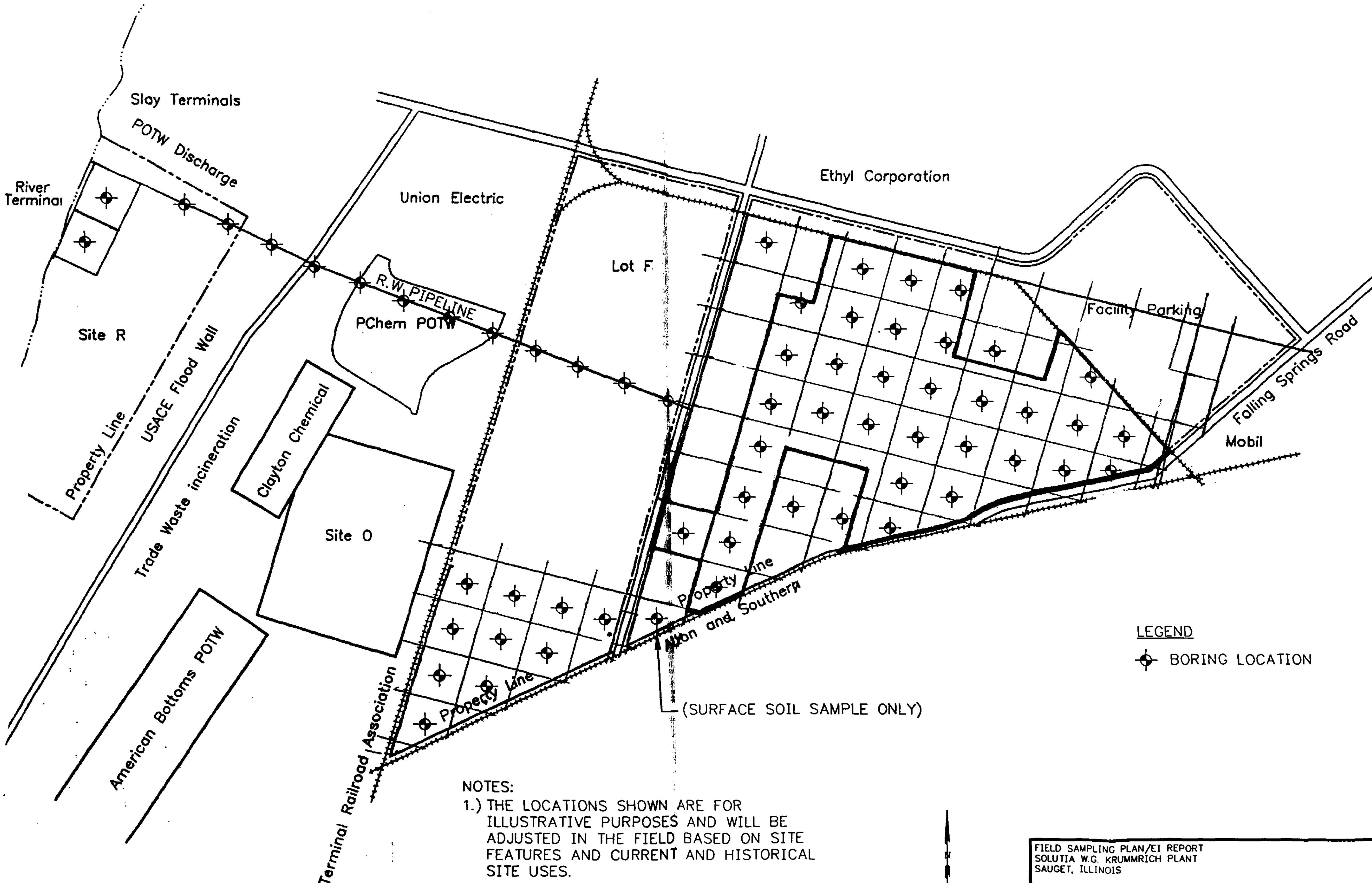


0 600
SCALE FEET

SOURCE: SURDEX AERIAL PHOTOGRAPHY DATED APRIL 2000.

File: E:\21561197.00000\SITE LOCATION.DWG Last edited: NOV. 15, 02 @ 11:27 a.m. by: DJDEGUIO

CA 750 MIGRATION OF CONTAMINATED GROUNDWATER UNDER CONTROL SOLUTIA W.G. KRUMMRICH PLANT SAUGET, ILLINOIS	PROJECT NO. 21561197.00001
URS	
DRN. BY: djd 10/24/02 DSGN. BY: at CHKD. BY:	Site Location Map
FIG. NO. 1	



NOTES:

1.) THE LOCATIONS SHOWN ARE FOR ILLUSTRATIVE PURPOSES AND WILL BE ADJUSTED IN THE FIELD BASED ON SITE FEATURES AND CURRENT AND HISTORICAL SITE USES.

2.) SURFACE SOIL SAMPLE ONLY DUE TO STAINED AREA AS OBSERVED ON AERIAL PHOTOGRAPH DATED 1964.

FIELD SAMPLING PLAN/EI REPORT SOLUTIA W.G. KRUMMRICH PLANT SAUGET, ILLINOIS	PROJECT NO. 21561197.00002
URS	
DRN. BY: djd 11/15/02 DSGN. BY: at CHKD. BY:	BORING LOCATION MAP
FIG. NO.	2

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APPENDIX A

Conceptual Site Model

Conceptual Site Model
To Support
RCRA Environmental Indicators Evaluation
Current Human Exposures Under Control (CA-725)

Solutia W.G. Krummrich Facility
Sauget, Illinois

This Conceptual Site Model (CSM) has been developed for the Solutia W.G. Krummrich facility to support the Environmental Indicator (EI) evaluation for human health (Current Human Exposures Under Control [CA-725]). The Solutia W.G. Krummrich facility is located in the Village of Sauget, Illinois. The facility and surrounding areas are highly industrialized, and have been so since the early 1900s. The area is zoned commercial/industrial and it is reasonably expected that these areas will continue as such for the foreseeable future.

The CSM, graphically depicted in **Figure 1**, identifies the potentially complete exposure pathways and the sources and mechanisms by which a human receptor might be exposed. The CSM reflects current use scenarios; future use scenarios are not considered for EI evaluations. The CSM helps in the identification of data needs for completion of the EI evaluation.

Constituents from historic releases at the facility have impacted surface and subsurface soils and, in some cases, have leached to groundwater. Volatile organic compounds (VOCs) present in soils and shallow groundwater may volatilize into outdoor air and may infiltrate into indoor air in overlying buildings. Groundwater is not used as a source of process or potable water in the area, and its use as a potable supply is prohibited by ordinance in the Village of Sauget. The Mississippi River is the primary discharge feature for groundwater in the area. Constituents in groundwater discharging to the river may pose a concern for ecological receptors.

Human receptors potentially affected by these releases are described in the following paragraphs. For consistency, the receptor groups are those identified in Question 3 of the EI form.

Workers

The primary human receptors of concern are site workers, and as such, are the focus of the discussion below. However, offsite workers will be evaluated where there is a possibility of excavation and contact with affected groundwater or inhalation of volatilized vapors from underlying soil and/or groundwater.

- Construction/Utility Worker

The construction/utility worker will be evaluated for potential exposure to constituents in surface and subsurface soils to depths of approximately 15 ft below ground surface (bgs). This is typically the maximum depth of utilities at the facility that could require maintenance. Additionally, in areas of the facility where groundwater is present at these depths, the construction/utility worker will be evaluated for potential contact with constituents in shallow groundwater. Exposure to the construction/utility worker could occur through:

  - Incidental ingestion and inhalation of, and dermal contact with, constituents present in surface and subsurface soil, and groundwater.

- Outdoor Worker

Most of the facility areas are covered and/or there are exposure controls in place (e.g., excavation permit policy) to minimize or prevent exposure. The outdoor worker will be evaluated for potential exposure to constituents present in soil and groundwater as described below. Exposure to the outdoor worker could occur through:

  - Incidental ingestion and inhalation of, and dermal contact with, constituents present in surface soil; and
  - Inhalation of constituents volatilized from surface and subsurface soils and groundwater[1].

- Indoor Worker

There are only a few buildings at the facility that have basements. In addition, most buildings routinely occupied by workers, e.g., control rooms, are under positive pressure conditions that minimize or prevent accumulation of vapors. However, to address the few areas not as described above, the indoor site worker will be evaluated for potential exposure to constituents volatilized from surface and subsurface soil and groundwater.

Trespasser

Trespassers are not receptors of concern for this EI, based on current exposure conditions at the facility. The site properties are fenced and there is 24 hr/day security (including video surveillance and routine patrols). There are no special land features that would cause the facility to be attractive to trespassers. The Mississippi River in the area is primarily used for barge staging and loading/unloading, and is otherwise not conducive to human activities.

[1] Volatilization from groundwater will be evaluated for areas of the facility where groundwater is present at depths to approximately 30 ft.

Residential

Residential receptors do not pose a concern for the purposes of this EI. The closest residential areas are at least 1/2 mile from the facility boundaries. This area is hydraulically upgradient from the facility. Residential areas are not located above an area of known groundwater impact, and local ordinance prohibits installation of water wells for potable uses.

Day Care

Receptors in Day Care facilities do not pose a concern for the purposes of this EI. The nearest day care facilities are over 1.5 miles from the facility, and would not be affected by historical releases from the facility. They are not located above an area of known groundwater impact, and local ordinance prohibits installation of water wells for potable uses.

Recreation

The nearest park is over 1/4 mile from the facility. Although there are general recreation activities in the river, under current conditions, humans are not receptors of concern. The river bank is steep and rip-rap covered, and the current is swift along the shoreline. The area is primarily used for barge staging and loading/unloading, and is otherwise not conducive to human activities.

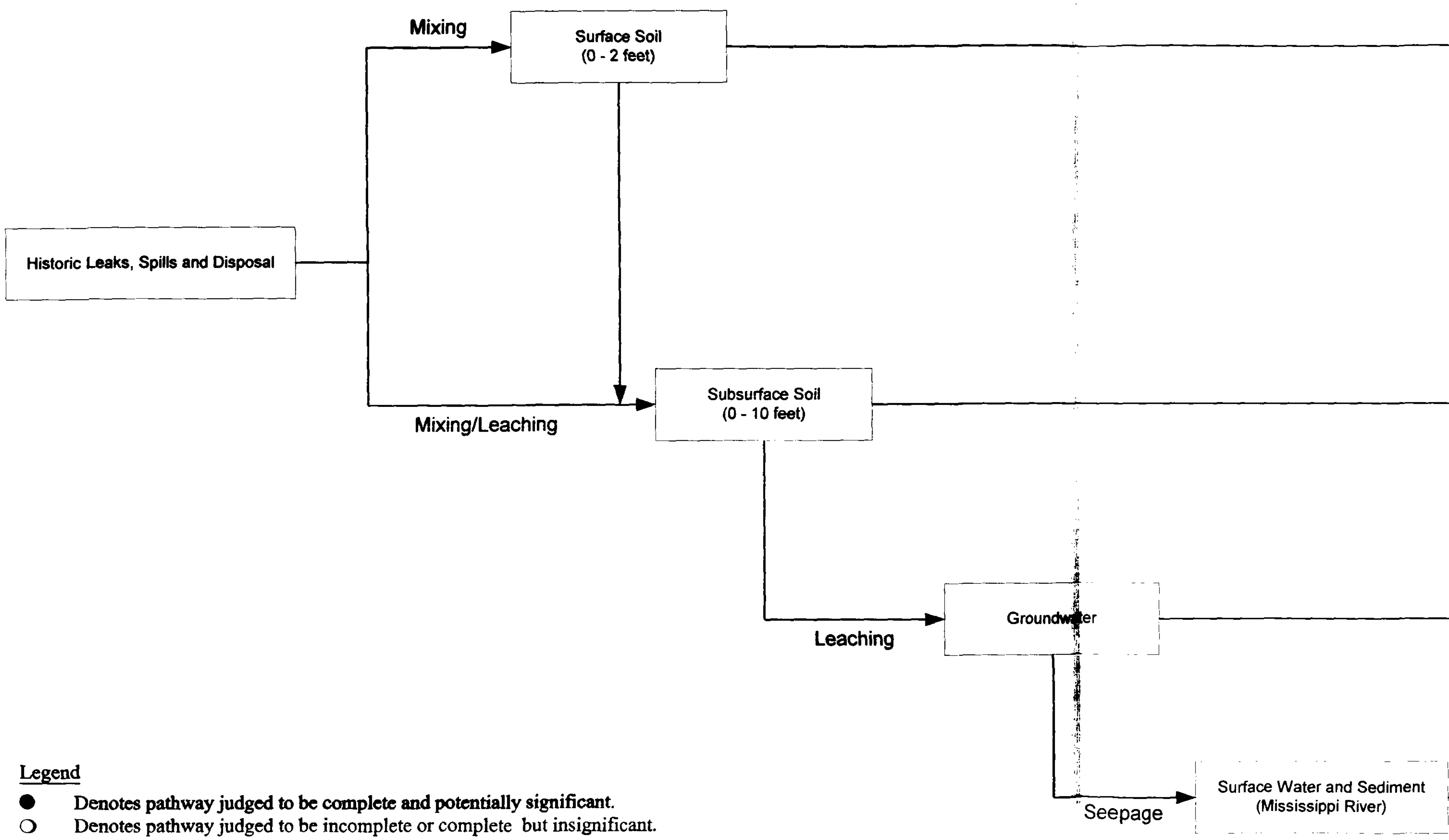
Food

Food crops (commercial scale) are not grown in this area. Recreational fishing in the Mississippi River is limited, but can occur. Potential indirect exposure to humans via consumption of fish will be evaluated.

Summary of Data Needs to Complete EI Evaluation

A significant amount of soil and groundwater data exist for the facility, and these data are summarized in the Description of Current Conditions (DOCC) report (Solutia, 2000). These data will be reviewed in the context of this CSM, the EI guidance, and Agency input, and data gaps will be identified and plans developed to acquire the necessary data. At this time, Solutia believes that additional data are needed to evaluate potentially complete soil and air (primarily indoor) pathways.

Figure 1
Site Conceptual Exposure Model
Solutia - W.G. Krummrich Plant RCRA Human Health Environmental Indicator Evaluation
CA-725



Exposure Routes & Receptors (CA-725 Question 3)

Medium	Route	Workers: Construction/Utility Worker[1]	Workers: Outdoor Site Worker	Workers: Indoor Site Worker	Trespasser	Residents	Day-Care	Recreation	Food (indirect pathway/receptor)
Surface Soil (0 - 2 feet)	Ingestion	●	●	○	○	○	○	○	○
	Dermal	●	●	○	○	○	○	○	○
	Inhalation	●	●	●	○	○	○	○	○
Subsurface Soil (0 - 10 feet)	Ingestion	●	○	○	○	○	○	○	○
	Dermal	●	○	○	○	○	○	○	○
	Inhalation	●	●	●	○	○	○	○	○
Groundwater	Ingestion	●[2]	○	○	○	○	○	○	○
	Dermal	●[2]	○	○	○	○	○	○	○
	Inhalation	●	●	●	○	○	○	○	○
Surface Water and Sediment (Mississippi River)	Ingestion	○	○	○	○	○	○	○	●[3]
	Dermal	○	○	○	○	○	○	○	○
	Inhalation	○	○	○	○	○	○	○	○

Legend

● Denotes pathway judged to be complete and potentially significant.

○ Denotes pathway judged to be incomplete or complete but insignificant.

Notes

1 For the construction/utility worker, there is no construction currently planned or anticipated, however this pathway could be complete in the near future (e.g., excavation to repair a broken water line), and as such is considered a potential "current" scenario for this EI.

2 The construction/utility worker will be evaluated for potential contact with constituents in groundwater for areas of the plant where groundwater is present at depths less than 15 ft.

3 The potential for indirect exposure to humans via consumption of fish will be evaluated.

November 2002

APPENDIX B

Soil Sampling Standard Operating Procedures (SOPs)

APPENDIXB

Soil Sampling SOPs

Surface Soil Sample Collection

Use the following procedure to collect a sample:

1. Borings will be advanced via direct push technology (Geoprobe®). The Geoprobe® will hydraulically drive a stainless steel, acetate-lined MacroCore® sampler (2-inch diameter by 4-foot length) to the desired surface sample depth.
2. Following sample collection, the sampler will be retrieved to the surface and the soil sample removed from the disposable acetate liner within the sampler.
3. Record the characteristics of the soils, including grain size, content, staining, and color.
4. To collect a discrete soil sample for VOC analysis, a 5-gram EnCore® sampler will be used. After pressing the sampler into the soil at the sampling location, cap the coring body while it is still in the EnCore® sampler T-handle. To collect a discrete soil sample for other parameters, use a stainless steel laboratory spoon or equivalent. Homogenize the non-VOC samples as necessary.
5. Place the homogenized sample into appropriate sample containers. In addition to analytical samples, a reference sample considered representative of the soil may also be collected in a wide mouth jar and stored for possible future physical analyses such as grain size analysis.
6. Check that the cap of each sample container has a Teflon® liner, if required for the analytical method. Secure the cap tightly.
7. Label the sample container with the appropriate sample tag. The tags could be permanent labels or clean tape. Label the tag carefully and clearly using indelible ink. Complete appropriate sampling forms and record in the field notebook. Pre-labeled containers are handy, particularly if you are wearing gloves or if the weather is inclement.
8. Initiate the chain-of-custody form.
9. Place the capped EnCore® sampler core bodies and other sample containers on ice in a cooler to maintain the samples at approximately 4°C. Ship the cooler to the laboratory for analysis within 48 hours of sample collection.
10. Decontaminate equipment between sample locations and after use as described below.

Subsurface Soil Sample Collection

The sampling procedure will be as follows.

1. Borings will be advanced via direct push technology (Geoprobe®). The Geoprobe® will hydraulically drive a stainless steel, acetate-lined MacroCore® sampler (2-inch diameter by 4-foot length) to the desired subsurface sample depth. Following sample collection, the sampler will be retrieved to the surface and the soil sample removed from the disposable acetate liner within the sampler.
2. Recovered soil samples will be screened in the field for evidence of impact with visual and olfactory observation and a photoionization detector (PID). The soil interval exhibiting the greatest impact will be submitted to the laboratory for analysis.
3. A 5-gram EnCore® sampler will be used to collect VOC samples from the subsurface soil. Use the EnCore® sampler to collect a VOC sample from the top portion of sample in the MacroCore® sampler.
4. Descriptive logs of each boring will be prepared as described in Appendix C.
5. Follow chain-of-custody procedures.
6. All borings will be grouted to the surface, following retrieval of both the waste and soil samples.

Boring equipment will be decontaminated and investigation-derived waste will be disposed of as described below.

APPENDIX C

Guidance for Soil Sample Logs and Example Boring Log

APPENDIXC Guidance for Soil Sample Logs and Example Boring Log

At the outset of sample logging, the on-site geologist will record field notes with waterproof ink in a bound field notebook. At a minimum, the daily field notes will include:

- Project name and number
- Date and time
- Weather conditions
- Sampler's name
- Project objective(s).

Throughout the sampling round, the following items will be recorded as appropriate:

- Sample location(s)
- Sample identifications
- Limiting field conditions
- Problems encountered.

A copy of the boring log to be used is included as Appendix D.

Unconsolidated soil samples will be described as follows:

- Descriptive information:
  - Color name (Munsell Color Chart) of the logged interval or sample
  - Color notation including chroma, hue, value, and qualifiers

1. Mottling with abbreviations, descriptors, and criteria for descriptions of mottles as identified below

Descriptors for Mottling

Abundance	Size	Contract
f: few (<2%)	fine (<5 mm)	faint
c: common (2%-20%)	medium (5-15 mm)	distinct
m: many (>20%)	coarse (>15 mm)	prominent

2. Degree of saturation (dry, damp, moist, wet, saturated, or combinations); note depth to groundwater table, if observed

3. Degree of density. Count the blows of each 12-inch increment of the sampler (ASTM-1586-84). Use the values and the density table presented below to determine the degree of density.

Degree of Density

Cohesive Clays		Non-cohesive Granular Soils	
0-2	very soft	0-3	very loose
2-4	soft	4-9	loose
5-7	firm	10-29	medium dense
8-15	stiff	30-49	dense
16-29	hard	50-80	very dense
30-49	very hard	80+	extremely dense
50-80	extremely hard		

4. Soil description according to ASTM's Unified Soil Classification System (USC) and by soil structure:

   – ASTM Unified Soil Classification: The Grade Limits and Grade Standards table presented below provides the grade limits and grade names used by engineers according to ASTM standards D422-63 and D643-78.

Grade Limits and Grade Standards

Grade Limits		Grade Names	
mm	inch	US standard sieve series	
			boulders
305	12.0		
			cobbles
76.2	3.0	3.0 inch	
			gravel
4.75	0.19	No. 4	
2.00	0.08	No. 10	
			medium sand
0.425		No. 40	
0.074		No. 200	
			silt
0.005			
			clay size

Source: AGI data sheet 29.2

   – Course-grained soils include clean gravels and sands and silty or clayey gravels and sands with more than 50% retained on the No. 200 sieve. A table of USC symbols and names for coarse-grained soils is presented below.

APPENDIX C Guidance for Soil Sample Logs and Example Boring Log

USCS Symbols and Names for Coarse-grained Soils

USCS Symbol	Typical Names
GW	Well graded gravels, gravel-sand mixtures, little or no fines
GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
GM	Silty gravels, gravel-sand-silt mixtures
GC	Clayey gravels, gravel-sand-clay mixtures
SW	Well graded sands, gravelly sands, little or no fines
SP	Poorly graded sands, gravelly sands, little or no fines
SM	Silty sand, sand-silt mixtures
SC	Clayey sands, sand-clay mixtures

- Fine-grained soils include inorganic and organic silts and clays; gravelly, sandy, or silty clays; and clayey silts with more than 50% passing the No. 200 sieve. A table of USC symbols and names for fine-grained soils is presented here.

USCS Symbols and Names for Fine-grained Soils

USCS Symbol	Typical Names
ML	Inorganic silts and very fine sands, rock flour, silty, or clayey fine sands, or clayey silts with slight plasticity
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
OL	Organic silts and organic silty clays of low plasticity
MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
CH	Inorganic clays or high plasticity (residual clays), fat clays
OH	Organic clays of medium to high plasticity, organic silts
Pt	Peat and other highly organic soils

A table of soil descriptors is presented below. (this goes with #4, needs hyphened bullet)

Soil Descriptors

Calcareous:	containing appreciable quantities of calcium carbonate
Fissured:	containing shrinkage cracks, often filled with fine sand or silt, usually more less vertical
Interbedded:	containing alternating layers of different soil types

Soil Descriptors

Intermixed:	containing appreciable, random, and disoriented quantities of varying color, texture, or constituency
Laminated:	containing thin layers of varying color, texture, or constituency
Layer:	thickness greater than 3 inches
Mottled:	containing appreciable random speckles or pockets of varying color, texture, or constituency
Parting:	paper thin
Poorly graded (well sorted):	primarily one grain size, or having a range of sizes with some intermediate size missing
Slickensided:	having inclined planes of weakness that are slick and glossy in appearance and often result in lower unconfined compression cohesion
Split graded:	containing two predominant grain sizes with intermediate sizes missing
Varved:	sanded or layered with silt or very fine sand (cyclic sedimentary couplet)
Well graded (poorly sorted):	containing wide range of grain sizes and substantial amounts of all intermediate particle sizes
Modifiers:	Predominant type - 50% to 100% Modifying type - 12% to 50% With - 5% to 12% Trace - 1% to 5%

5. Degree of plasticity. The following table presents the terms used to denote the various degrees of plasticity of soil that passes the No. 200 sieve.

Degrees of Plasticity

Descriptive Term	Degree of Plasticity	Plasticity Index Range
SILT	none	non-plastic
Clayey SILT	slight	1-5
SILT & CLAY	low	5-10
CLAY & SILT	medium	10-20
Silty CLAY	high	20-40
CLAY	very high	over 40

6. Drilling information:
   - Drill rig manufacturer, model, and driller (if applicable)
   - Geologist or geotechnical engineer
   - Project name, sample point identification, and location

APPENDIX C Guidance for Soil Sample Logs and Example Boring Log

- Date samples obtained (and times if required)
- Type of sampler (e.g., split spoon, Shelby, California), measurements or method of advancing boring or equipment, method of driving sampler, and weight of hammer
- Drill fluids (if applicable)
- Ground surface or grade elevation (if known)
- Depth penetrated and blow counts/6-inch interval of penetration for ASTM 1586-84 and sample number (if applicable)
- Closed hole intervals and advancement (if applicable)
- Recovery
- Strata changes and changes within samples
- Sampling tool behavior
- Drill string behavior
- Use(s) of borehole
- Disposition(s) of residual soil or cuttings
- Signature or sampling of log (as required)

URS

LOG OF BORING

SHEET 1 of 1

PROJECT NAME/NUMBER LOCATION		DATE STARTED	DATE COMPLETED
DRILLING CONTRACTOR	FOREMAN	GROUND ELEVATION (FT. MSL)	WATER DEPTH (FT BGS):
DRILLING EQUIPMENT		COMPLETION DEPTH (FT BGS)	ROCK DEPTH (FT BGS)
GEOLOGIST/ENGINEER		BORING LOCATION	

DESCRIPTION	Sample Run	Depth (FT BGS)	Water Table	SAMPLES Recov. (in)	SAMPLES Time	USC	PID Readings Head Space (ppm)	REMARKS
		- 0 -						
		- 1 -						
		- 2 -						
		- 3 -						
		- 4 -						
		- 5 -						
		- 6 -						
		- 7 -						
		- 8 -						
		- 9 -						
		- 10 -						
		- 11 -						
		- 12 -						
		- 13 -						
		- 14 -						
		- 15 -						
		- 16 -						
		- 17 -						
		- 18 -						
		- 19 -						
		- 20 -						

APPENDIXD

Quality Assurance/Quality Control (QA/QC) SOPs

APPENDIXD Quality Assurance/Quality Control (QA/QC) SOPs

QA/QC samples will consist of:

- One duplicate per ten, or fraction of ten, environmental samples collected
- One MS/MSD per twenty, or fraction of twenty, environmental samples collected
- One field blank (or equipment blank) per ten, or fraction of ten, environmental samples collected
- One trip blank for each sample cooler containing samples for VOC analysis.

Duplicate samples are collected to measure consistency of field sampling techniques. MS/MSD (matrix spike/matrix spike duplicates) are collected to measure laboratory quality control procedures. The field blank will be submitted to the laboratory with the investigative samples and analyzed for the same parameters as the investigative samples. The minimum required is one per ten, or fraction of ten, environmental samples collected, unless dedicated or disposable sampling equipment is used to collect samples.

APPENDIX E

Sample Chain-of-Custody

CHAIN OF CUSTODY RECORD

URS CORPORATION

2318 MILLPARK DR.
MARYLAND HEIGHTS, MISSOURI 63043
314-429-0100

PROJECT NO:	PROJECT NAME:								
SAMPLER'S: (Signature)									
DATE	TIME	SAMPLE I.D. NUMBER	NO. OF CONTAINERS	CONTAINER DESCRIPTION / ANALYSES REQUESTED					REMARKS

RELINQUISHED BY: (Signature)	DATE / TIME	RECEIVED BY: (Signature)	DATE / TIME
RELINQUISHED BY: (Signature)	DATE / TIME	RECEIVED AT LAB BY: (Signature)	DATE / TIME
METHOD OF SHIPMENT:		AIRBILL NO:	